Case Study 1
Clackamas County Farm

Location: Clackamas County, zip code 97015
Approx. 40 miles SSE of Portland, Oregon.

Description: Enclosed-house broiler operation with an irrigated hayfield and non-irrigated hazelnut and apple orchards.

General:
- ~11 acres headquarters, including chicken houses.
- ~41 acres hayfield.
- ~103 acres hazelnut orchards
- ~50 acres apple orchards (not shown on map)
- Main roads into site are paved. Lanes on farm are graveled and accessible to large trucks.
- The farmer owns one 100 hp tractor

Broiler Operation:
- The farmer is a "contract grower" who supplies the power, land, buildings and labor for the broiler facility to grow chickens for an integrator who supplies the chicks, feed and medications.
- 134,000 average number of broilers
- 6 ventilated chicken houses
  - The ventilation system uses 34-inch fans that are 7 years old and have an efficiency rating of 12 CFM per watt.
  - Fan blades are cleaned and motors are inspected once a year, unless a problem arises.
  - Houses are heated with unvented propane space heaters.
  - Lighting is supplied with the older T-12 fluorescent bulbs
  - Houses are tight but not insulated
  - Circulation fans have not been installed.
- Other farm buildings on-site include a small storage barn and a 7200 sq.ft. enclosed manure drystack.
- Mortalities are temporarily stored in a bin on-site and picked up and transported off-site weekly.

Manure Handling:
- 362 Animal Unit Equivalents (AUEs)
- 63.9 lbs manure/AUE/day + 4.9 lbs bedding/AUE/day
- 23,149 lbs manure/day + 1,769 lbs bedding/day
- 4,225 tons manure/year + 645,759 lbs bedding/year
- No collected rainfall
- Bedding is sawdust and grass seed hulls.
- Manure is removed every 50 days between grows and there are 7 grows per year.
- Manure drystack is covered and provides 6 months of storage.
- Chicken litter is spread on the hayfield and hazelnut and apple orchards.
  - Some litter is picked up by an off-site commercial compost business.

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Cropland

- Hayfield
  - Permanent hayfield is irrigated with a diesel-powered big gun. The system pressure is approximately 80 psi. Two inches of water per week is applied from mid-July through October regardless of the weather. Water is pumped from a 30-ft well.
  - A contractor hauls the hay off.
  - No commercial fertilizer is used
  - The manure spreader applies one ton of manure equivalent to 162-188-112 (N-P-K) and this is spread on hayfield during the growing season.
- Hazelnut orchard
  - Trees are mature and shade the ground floor.
  - No vegetation grows under the trees.
  - Trees are pruned annually.
  - Trees are not irrigated.
  - Manure is occasionally spread in the trees late in the year after harvest. The manure spreader is unable to spread at a lower rate than that used for the hayfield.
- Apple orchard
  - Grass grows under the apple trees and is mowed periodically.
  - Trees are not irrigated.
  - Manure is occasionally spread in the trees late in the year after harvest. The manure spreader is unable to spread at a lower rate than that used for the hayfield.
  - Diesel smudge pots are currently used for frost protection.

Objectives:

- Farmer is looking for ways to save energy and money on propane gas used to heat the chicken houses year-round. The cost of power has increased to the point where the grower is wondering whether he can stay in business. He has heard of a “litter burner” as a way to use chicken litter to heat the chicken houses.
- Farmer is also looking for ways to save energy throughout the operation in general.
- Farmer wants to reduce the dust generated by the chicken house fans. In particular, the northeastern-most chicken houses have fans that deposit dust near the neighbor’s house.
- Farmer wants to address dust emissions from the hazelnut harvesting operations and unpaved roads. Hazelnuts are shaken from the tree and swept up from the bare ground below the trees.

Additional Info: Several new houses have been built near the operation, including some near the chicken houses.

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Energy Exercise Directions

1. Considering the landowner's objectives and concerns, identify the activities on the operation that use significant amounts of energy.

2. Identify alternatives to the above activities that can help the landowner save energy.

3. Run the poultry module of the animal housing energy awareness tool and the irrigation energy awareness tool to estimate energy use and potential savings in these areas.

4. Identify renewable energy opportunities for this farm.

5. Summarize your recommendations in a report for the group.

Air Quality and Atmospheric Change
Airshed and On-Farm Assessment Steps

1. Airshed Assessment: Meteorology/Climatology/Topography/Landscape:
   - Briefly describe the topography and landscape characteristics of the farm in question (see topo sites on web reference handout sheet, or others). Get a rough sense about the area of the farm and regions outside the farm, at various scales—familiarize yourself with the farm situation with regard to potential airsheds and watersheds
   - Briefly describe the possible weather and climate factors that may influence the air quality impacting the farm. At a minimum this should include:
     - Examine the relevant wind roses for at least several months
     - Examine a temperature, humidity and precipitation summary for a nearby location, including information on inversion potential

2. Airshed Assessment: Pollutant Formation and Sources, and Resource Concerns
   - Briefly review and document the potential agricultural air emissions of importance (as presented in class)
   - Briefly review NRCS AQAC resource concern components and quickly hypothesize about how each may be relevant to this farm situation
   - Briefly examine the emissions sources outside the farm that may affect the farm's management of air emissions, and describe how these relate to NRCS AQAC resource concerns. Emission sources nearby and those at distance that may be of concern

3. Airshed Assessment: Relevant Regulations and Receptors
   - Is the farm in a nonattainment area for a criteria pollutant? If so, identify and document these
   - Are there any nearby federally-protected Class I Areas? If so, identify and document these
   - Are there any federal, state, regional, and/or local air quality regulations of concern to this operation? If so, identify and document these.
   - Examine the nearby area for receptors of concern and document these (include schools, hospitals, residences, retail, roads, others?)

4. On-Farm Assessment:
   - Trust your senses, especially sight and smell. Observe not only existing air quality issues, but also situations which could lead to or indicate a potential air quality problem. Record these observations.
   - Identify and evaluate on-farm sources of air emissions of concern
   - Location, location, location. How does this affect this operation?
   - Use the AQAC On-Farm Assessment Checklists to evaluate potential sources and emissions
   - Use appropriate AQAC tools to evaluate emissions, options, etc. (COMET-VR, SNAP, others)

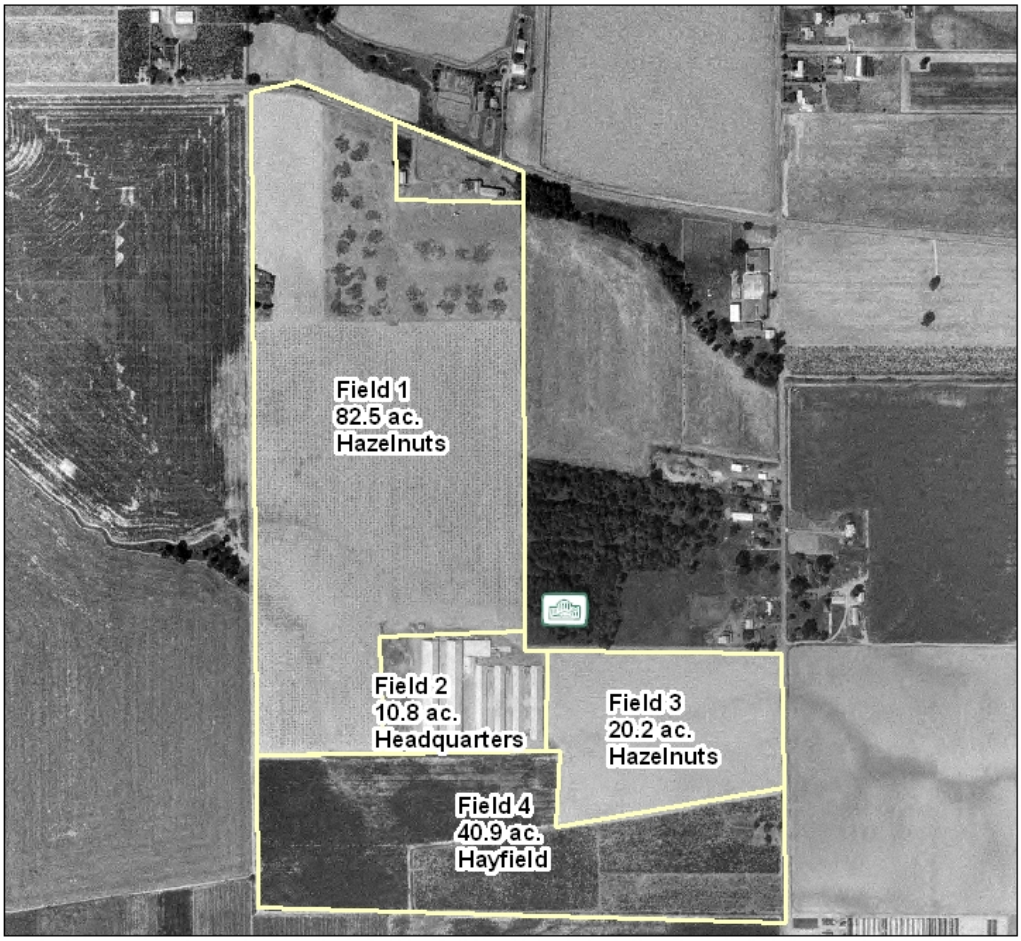
- If interested in carbon sequestration in soils and vegetation, evaluate predicted carbon storage with current management using COMET-VR, then make an additional run to predict changes on carbon storage with changes in land management
- Rank these emissions and sources by their importance relative to conservation and regulatory goals (manage to be "out of control"): Prioritize actions!
- Design conservation activities/practices/systems to specifically address these actions and outcomes. Consider specific practice standards that may be relevant Look for synergies – be efficient!
- Think about how these conservation activities/practices/systems may impact other resources (i.e., SWAPA+H and Energy?)
- Review and recommend specific NRCS Programs to implement AQAC practices/activities

Reference material:

- Website References for AQAC Information
- AQAC Definitions and Acronyms
- AQAC Activity-Practice List
- AQAC Practice Standards Air Check
- AQAC On-Farm Assessment Checklists

District: CLACKAMAS CO SWCD
Field Office: OREGON CITY SERVICE CENTER

Agency: USDA NRCS



Approximate Acres: 154.4

Legend

Neighbor House

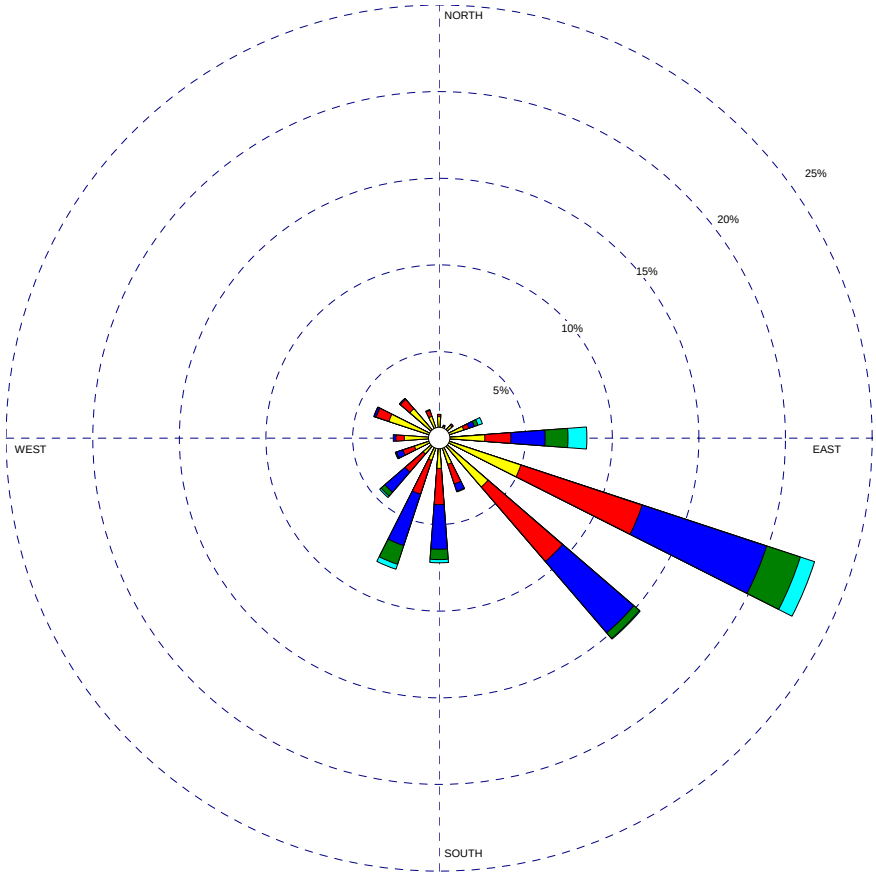
390 0 390 780 1,170 1,560
Feet

N

January Wind Rose for Portland

WIND ROSE PLOT

Station #24229 - PORTLAND/INT'L ARPT, OR



Wind Speed (m/s)

- > 11.06
- 8.49 - 11.06
- 5.40 - 8.49
- 3.34 - 5.40
- 1.80 - 3.34
- 0.51 - 1.80

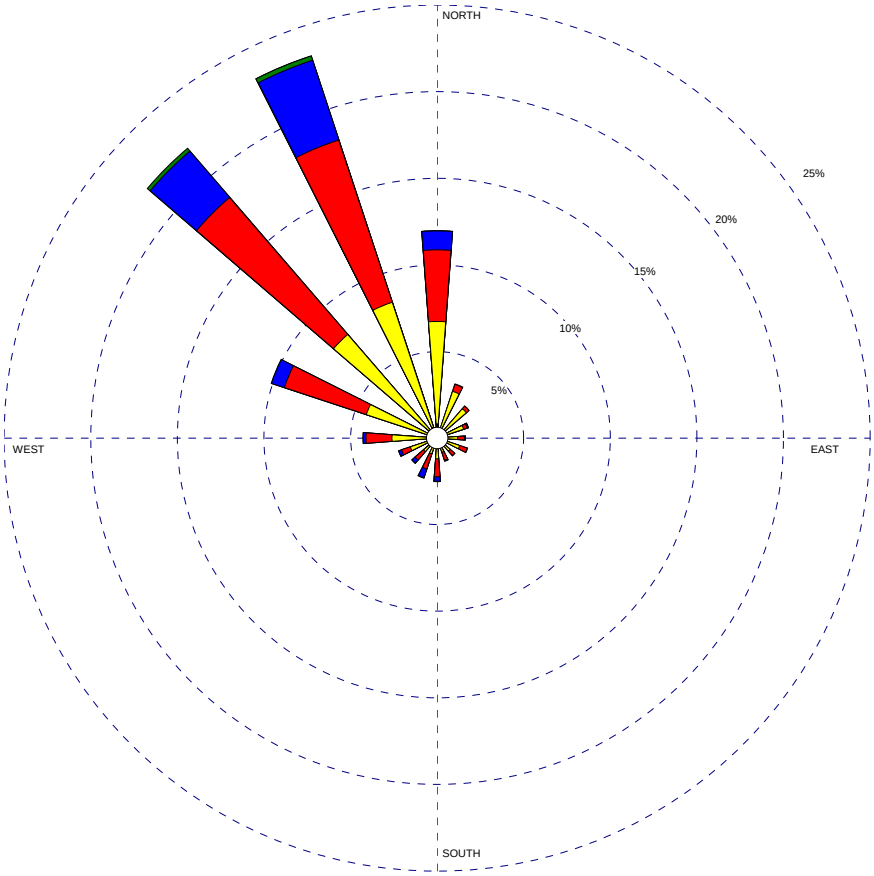
MODELER **Sara West**	DATE **9/5/2002**	COMPANY NAME **USDA-ARS**
DISPLAY **Wind Speed**	UNIT **m/s**	COMMENTS
AVG. WIND SPEED **4.93 m/s**	CALM WINDS **10.38%**	
ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1961** **Jan 1 - Jan 31** **Midnight - 11 PM**	

WRPLOT View 3.5 by Lakes Environmental Software - www.lakes-environmental.com

July Wind Rose for Portland

WIND ROSE PLOT

Station #24229 - PORTLAND/INT'L ARPT, OR



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MODELER **Sara West**	DATE **9/5/2002**	COMPANY NAME **USDA-ARS**
DISPLAY **Wind Speed**	UNIT **m/s**	COMMENTS
AVG. WIND SPEED **3.71 m/s**	CALM WINDS **5.15%**	
ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1961** **Jul 1 - Jul 31** **Midnight - 11 PM**	

WRPLOT View 3.5 by Lakes Environmental Software - www.lakes-environmental.com